US Army Corps of Engineers ®
Norfolk District

PROPOSED PLAN
Source Area 6 – Track K Dump
Former Nansemond Ordnance Depot

U.S. ARMY CORPS OF ENGINEERS, NORFOLK DISTRICT, AND U.S. ENVIRONMENTAL PROTECTION AGENCY ANNOUNCE PROPOSED PLAN

INTRODUCTION

This **Proposed Plan** explains why **no further action** is necessary to protect human health and the environment at Source Area 6 – Track K Dump (Tire Pile/Paint Can Area) at the **Former Nansemond Ordnance Depot (FNOD)**. This Proposed Plan includes a summary of previous site investigations, debris removal, and confirmation sampling, which have led to proposing no further action at this site. This Proposed Plan has been prepared in accordance with the requirements of the **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)**, also known as **Superfund**. A final decision will be made after reviewing and considering all information submitted during the 30-day **public comment period**. This Proposed Plan may be modified based on any new information acquired during the designated public comment period. Therefore, the public is encouraged to review and comment on the information presented in this Proposed Plan.

This Proposed Plan summarizes information that can be found in greater detail in the supporting documents listed in the **Administrative Record** file for this site. The Administrative Record file can be examined at locations shown in the text box on this page and in Section 6.0 of this Proposed Plan. The public is encouraged to review these documents to gain a more comprehensive understanding of Source Area 6 and other Superfund activities that have been conducted at FNOD.

This Proposed Plan provides an overview of the status of Source Area 6 and is divided into the following sections:

1.0 Site Background,
2.0 Site Characteristics,
3.0 Scope and Role of the Proposed Action,
4.0 Summary of Site Risks,
5.0 No Further Action Proposal,
6.0 Community Participation,
7.0 References, and
8.0 Glossary of Terms and Acronym List.

MARK YOUR CALENDAR

PUBLIC MEETING:
February 2, 2006 at 6:00 p.m.

Bon Secours Health Center at Harbour View
5818 Harbour View Boulevard
Suffolk, Virginia 23435
(757) 673-5800

Driving instructions:

From I-664 South - Take exit 9 (VA-164 East/US-17 North) towards Portsmouth/James River Bridge. Keep right at the fork in the ramp. Merge onto Bridge Road/US-17 North. Turn right at light onto Harbour View Boulevard. The center is located less than a mile on the right.

A Public Meeting will be held to explain the Proposed Plan. Oral and written comments will also be accepted at the meeting.

PUBLIC COMMENT PERIOD:
February 2, 2006 - March 3, 2006

Written comments on the Proposed Plan will be accepted during the public comment period.

For more information, see the Administrative Record at the following locations:

Tidewater Community College Library
7000 College Drive
Portsmouth, Virginia 23703
(757) 822-2124

U.S. Army Corps of Engineers, Norfolk District
803 Front Street
Norfolk, Virginia 23510-1096
(757) 201-7500

Words and terms included in the Glossary/Acronym List are indicated in **bold text** the first time they appear in this document.

1.0 SITE BACKGROUND

FNOD, established in 1917, is located on the southern banks of the James and Nansemond Rivers, in the northeast part of the City of Suffolk, Virginia. During its

period of operation between 1917 and 1950, FNOD was occupied by the U.S. Army for ammunition supply, maintenance, and disposal functions. In 1950, the site was transferred to the Department of the Navy, and was subsequently named the Marine Corps Supply Forwarding Annex. Following Navy operation, FNOD was deactivated in 1960, and ownership of the property was transferred to the private Beazley Foundation. FNOD land is now principally occupied by **Tidewater Community College (TCC)**, the **General Electric Corporation (GE)** Jet Engine Division, Ashley Capital, and the **Hampton Roads Sanitation District (HRSD)**. Smaller parcels of land are owned by the Virginia Department of Transportation (Interstate 664); Dominion Lands, Inc; Continental Properties; and SYSCO Food Services (**U.S. Army Corps of Engineers [USACE]**-Norfolk District, 2001a).

On January 19, 1999, the **U.S. Environmental Protection Agency (EPA)** proposed FNOD for inclusion on the **National Priorities List (NPL)**, which is the EPA's list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial action under Superfund. On July 22, 1999, the EPA made a final determination and placed FNOD on the General Superfund List for private sites (64 **Federal Register** No. 140, 39878). On the final determination, FNOD was listed as a Non-Federal Facility Superfund Site, as the Federal Government does not currently control any property at FNOD. However, the EPA has named the Federal Government, specifically the **Department of Defense (DoD)**, as a **Potentially Responsible Party (PRP)** for addressing environmental issues at FNOD. The NPL final listing included several "Source Areas" requiring investigation at FNOD. The area known as the Track K Dump was included on this NPL listing as Source Area 6 (USACE-Norfolk District, 2001a). This area was also known as the "Tire Pile/Paint Can Area" because a portion of the area was covered by a large pile of tires and a smaller pile of paint cans prior to debris removal activities performed in 2001.

FNOD is classified as a **Formerly Used Defense Site (FUDS)** pursuant to Public Law 98-212 of the **Environmental Restoration Defense Account**, and the **Defense Environmental Restoration Program (DERP)**, Chapter 160 of the **Superfund Amendments and Reauthorization Act (SARA)** of 1986. Under the law and through the DoD, the USACE has been assigned the responsibility for environmental investigations and remediation of FUDS resulting from DoD activities. The USACE-Norfolk District is the USACE geographic district responsible for oversight of FUDS activities at FNOD.

2.0 SITE CHARACTERISTICS

Source Area 6 is located in the north central portion of FNOD, west of South Road on the TCC campus. It is in an unused area of the TCC property, accessed by deteriorating former depot roads through a locked gate. The area was part of the Track K line of magazines during depot operations and is currently wooded. Figure 1 shows the location of the Source Area 6 in relation to FNOD. The historical aerial photographs showed evidence of dumping at Source Area 6 after 1964, but earlier photography provided evidence that the ground had been disturbed along the Track K magazines during DoD ownership. This evidence includes a prominent ground scar visible in 1954 aerial photos at the location that was later designated Source Area 6. This ground scar continues as a prominent feature through 1958, but it is barely visible in the photos available from 1963. Potential soil contamination could also have been a result of earlier DoD usage at the former depot (USACE-Norfolk District, 2002). Sometime after 1963, portions of the site became covered with two distinct piles of debris. One consisted of an area covering approximately 250 feet by 100 feet that contained various sizes of tires; the other consisted of a separate area to the south that contained a pile of paint and paint thinner cans. The paint can pile covered a circular area roughly 12 feet in diameter. Additional solid waste was strewn in the woods along and off the road. The waste included appliances, trash, and construction debris.

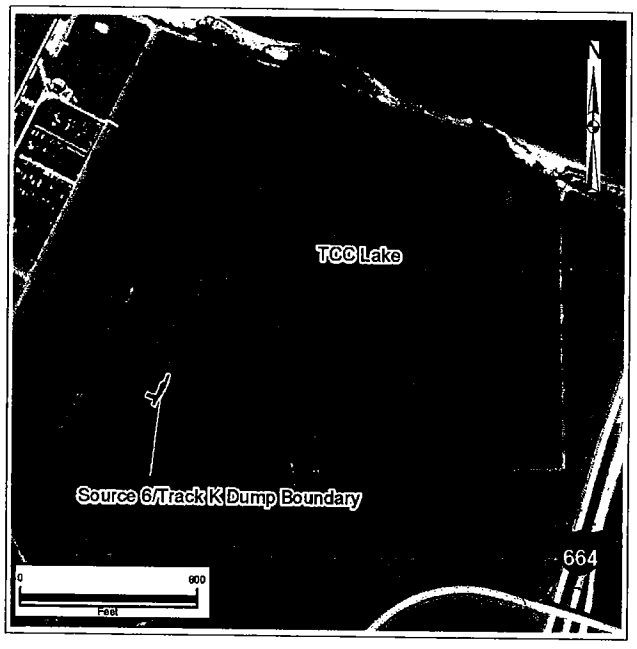

Figure 1: Location of Source Area 6, FNOD

In the **Hazard Ranking System** Documentation Record for FNOD (EPA, 1999), the EPA documented that the

debris accumulation at the site occurred after the end of DoD occupancy at FNOD. The piles are not evident on aerial photographs from 1968, 1972, or 1986, although by 1986 the area around the magazine foundation appears overgrown with vegetation, and it is possible that the piles are present but obscured. According to the Hazard Ranking System Documentation Record, the disposal likely occurred sometime between the mid-1970s and the early 1990s (EPA, 1999).

The tires and miscellaneous debris were removed in May and June 2001 in order to provide access to the soil beneath the debris. Because historical aerial photographs indicated that waste burial activities may have occurred at the site, several investigations were conducted at Source Area 6 to determine the nature and extent of any potential contamination and to determine whether the soil remaining at the site posed a potential threat to human health or the environment. Descriptions of the site activities are summarized below. For those seeking a level of detail beyond that which is provided herein, all source documents used in the summary provided below can be found in the associated Administrative Record file. The Administrative Record file can be examined at the locations presented in Section 6.0 of this Proposed Plan.

2.1 PRELIMINARY ENVIRONMENTAL SITE INVESTIGATION

In February 1997, Roy F. Weston, Inc., (now known as **Weston Solutions, Inc. [Weston]**), collected a single soil sample from the site. Weston also collected a single **background** sample near the TCC entrance to provide a benchmark for comparison with the site sample metals results. The results showed that the metals copper, iron, lead, manganese, mercury, nickel, and zinc, and the **semivolatile organic compounds (SVOCs)** fluoranthene and pyrene were detected in the source area sample at levels that exceeded those found in the background soil sample (EPA, 1999).

The data from this preliminary sampling event were only used to provide information for subsequent site activities; however, background concentrations cannot be adequately represented with a single background sample, and the results of this sampling event do not reliably demonstrate the presence of site-related contamination. Because the data were not validated, the results from this sampling event have not been included in either the screening risk assessment described in Section 2.4 or the risk assessments associated with the Remedial Investigation Report which are described in Section 4 in accordance with EPA guidance.

2.2 SITE CLEARING ACTIVITIES

In November 2000, the paint cans at the site were collected and placed inside two 85-gallon overpack drums. These drums were removed in the subsequent clearing activities performed at the site.

Site clearing activities occurred in May and June 2001. The material at the site consisted primarily of a pile of tires; other miscellaneous debris (such as refrigerators, stoves, and trash) scattered in the vicinity of the site were also included in the planned clearing activities. In addition to the tires and other debris, the two overpack drums containing the paint cans were removed (USACE-Norfolk District, 2001b). During site clearing activities, an **unexploded ordnance (UXO)** contractor was onsite to ensure site safety. No ordnance-related materials were found during clearance activities. All areas were cleared by the UXO contractor before remediation personnel were permitted access. Cleared material and the rusted paint cans were taken to a local sanitary landfill for disposal. During these activities, the boundaries of the tire pile were surveyed using a backpack **global positioning system (GPS)** unit.

On May 31, 2001, an excavator began removing the tires from the site. The tires were placed into a bucket loader for transport to the staging area, where large trucks were used to transport the tires to a recycling facility. Nine loads of approximately 60 cubic yards each were required to remove the waste tires from the site. Approximately 2,300 tires were removed from the pile. The total tonnage reported by the recycling facility was 57.97 tons of tires. The tires consisted of a mix of semi-tractor trailer tires, car and light truck tires (some still on the rims), and several large equipment tires. The majority of the tire pile consisted of the semi-tractor trailer tires. An additional area of trash and debris (six rusted, empty, 1-gallon paint cans, various parts of stoves and refrigerators, and household wastes) was found at the northeast corner of the former tire pile. This material was taken to the local sanitary landfill for disposal. After completing the tire and debris removal, the crushed stone road improvements and staging areas installed during mobilization were left in place. A full description of tire and debris removal activities was provided to USACE-Norfolk in a summary letter report (**HydroGeoLogic, Inc. [HGL]**, 2001).

2.3 JUNE 2001 PRELIMINARY POST-TIRE PILE REMOVAL ACTION SAMPLING

In June 2001, USACE-Norfolk collected soil samples following the removal of the tires and debris at Source Area 6. These samples were collected to provide

preliminary screening data to determine the necessity and scope for investigations into whether contamination resulting from DoD activities was present at the site. A total of 6 surface soil samples were collected from the area of the former tire pile (5 sample locations and one duplicate), and one surface soil sample was collected from the paint can area. All samples were analyzed for **volatile organic compounds (VOCs)**, SVOCs, **pesticides**, **polychlorinated biphenyls (PCBs)**, **explosives**, and metals. As a conservative screening tool, the soil sample results were compared to the EPA Region III **risk-based concentrations (RBCs)** for residential soil. The only analytes detected above RBCs for residential soil at the site were one SVOC (benzo[a]pyrene), one pesticide (dieldrin), and one metal (arsenic). Although a single benzo[a]pyrene result was numerically greater than the residential soil RBC, the result was an estimated value below the laboratory's reporting limit and there is a possibility that the true concentration is below the residential soil RBC. The arsenic concentrations detected in all samples were consistent with the background surface soil level of arsenic that was determined by a subsequent Background Sampling Program at the FNOD (Weston, 2004). There is no history of pesticide mixing, storage, or disposal at the site, and pesticides are not normally associated with the types of debris that were observed. There are no background data for pesticides; however, the dieldrin results at the site are consistent with those found at other sites at FNOD (SAIC, 2002; HGL, 2003) and it is possible that the dieldrin at the site is related to facility-wide pesticide application.

The results that were obtained from this sampling event were pooled with data collected in 2002 for performing the screening risk assessment at the site (see Section 2.4). The data were not validated, however, and were not pooled with the data set used to perform the risk assessments associated with the RI Report and described in Section 4.

2.4 FEBRUARY 2002 POST-TIRE PILE REMOVAL ACTION SAMPLING

The 2001 preliminary post-removal sampling did not conclusively show the presence or absence of site contamination, and it was determined that additional soil sampling using a revised list of analytical methods was necessary at the site. The methods selected included analysis for VOCs, pesticides, PCBs, explosives, **polychlorinated dibenzo-*p*-dioxins/polychlorinated dibenzofurans (PCDDs/PCDFs)**, and metals. These analytical methods were selected in order to determine if there were any contaminants at the site that were attributable to DoD activities.

Post-tire pile removal soil sampling was performed at the site in February 2002. In accordance with the sampling strategy approved by VDEQ, soil samples were collected from six locations at the site; five locations were within the former tire pile area, and one location was within the former paint can area. Two soil samples were collected from each of the six sampling locations: one from the 0- to 0.5-foot interval **below ground surface (bgs)** (surface soil), and one from the 5- to 5.5-foot bgs interval (subsurface soil). All sampling activities are summarized and documented in the letter report to the USACE-Norfolk District titled Sampling Trip Report, FNOD, August 20, 2002 (**MicroPact**, 2002).

A screening risk assessment was performed using the combined results of the June 2001 and February 2002 post-tire pile removal sampling. This screening risk assessment identified aluminum, arsenic, chromium, iron, benzo[a]pyrene, dieldrin, and PCDDs/PCDFs as **chemicals of potential concern (COPCs)** at the site. This screening risk assessment concluded that a quantitative risk assessment would be required for arsenic, benzo[a]pyrene, dieldrin, and PCDDs/PCDFs. Arsenic was detected in all samples; however, these detections are consistent with background concentrations. Benzo[a]pyrene was detected in only two surface soil samples at low concentrations (0.260 **milligrams per kilogram [mg/kg]** and 0.054 mg/kg). The screening level risk assessment did not evaluate the possibility that organic chemical concentrations at the site might be the result of widespread human activity, such as pesticide application, rather than site-specific activities. It was determined that additional samples of soil should be collected and analyzed for dieldrin and PCDDs/PCDFs.

2.5 FEBRUARY 2004 SUPPLEMENTAL SAMPLING

In February 2004, representatives of the USACE-Norfolk collected samples from 13 locations at the site. These samples were collected in an expanded area around the perimeter of the area previously sampled in 2002. Samples were collected at the surface (0-0.5 feet bgs) and near subsurface (1-2 feet bgs). These samples were submitted for analysis for dieldrin (all locations and depths) and for PCDDs/PCDFs (all surface soil locations and one subsurface soil location). Dieldrin was detected at 10 of the 13 surface soil sample locations but was detected at only 1 of the 13 associated subsurface soil sample locations. Two of the dieldrin surface soil results were above the RBC for residential soil. PCDDs/PCDFs were detected at all 13 surface soil locations and the single subsurface soil location. None of the PCDD/PCDF results were above the RBC for residential soil.

3.0 SCOPE AND ROLE OF THE PROPOSED ACTION

This Proposed Plan addresses Source Area 6 – Track K Dump only. It does not include or directly impact any other sites within the former Track K Explosives Magazine Line or other sites at FNOD. The purpose of the Proposed Plan is to summarize activities performed to date to investigate and clean up Source Area 6 and explain why no further action is necessary. As described in the following section, no human health or ecological risks were identified that require further action at Source Area 6.

4.0 SUMMARY OF SITE RISKS

A **human health risk assessment (HHRA)** and **screening level ecological risk assessment (SLERA)** were performed using the complete 2002 data set and the supplemental 2004 dieldrin and PCDD/PCDF data. Because the data from the June 2001 sampling event were of screening quality only and not validated, they were excluded from the HHRA and SLERA.

4.1 HUMAN HEALTH RISK ASSESSMENT

Please see the text box on the next page for an explanation of the HHRA process and the two types of risk (cancer and non-cancer) that the process considers.

In the first step of the HHRA, COPCs were identified for soil under current & future land use scenarios based on an evaluation of exposure to the soil itself and exposure to dust and vapors from the soil. The COPCs for exposure to soil under current land use conditions are total PCDDs/PCDFs, aluminum, arsenic, chloromethane, dieldrin, iron, pentane, and vanadium. Under potential future land use scenarios, the COPCs identified for exposure to soil were total PCDDs/PCDFs, 5,6,7,8-tetrahydro-2-naphthylamine, aluminum, arsenic, chloromethane, chromium, dieldrin, iron, pentane, and vanadium. The COPCs identified for exposure to dust generated during potential future excavation activities included 5,6,7,8-tetrahydro-2-naphthylamine, aluminum, beryllium, chromium, cobalt, lead, manganese, and pentane. No COPCs were identified when evaluated for exposure to dust and vapors generated by current land use activities.

The current and potential future land use of the site was evaluated in order to identify the types of people (**receptors**) that could be exposed to chemicals at the site. The receptors identified for current use of the site were the adult trespasser/visitor, adolescent trespasser/visitor, and industrial worker. Under current land use conditions, receptors can be exposed to chemicals in the surface soil through direct contact and through inhalation of dust or vapors. The potential future receptors included the adult and adolescent trespasser/visitor, industrial worker, adult resident, child resident, and construction worker. These receptors could be exposed to chemicals in the surface soil and subsurface soil through direct contact and through inhalation of contaminated dust and chemical vapors. Because the comparison to **soil screening levels (SSLs)** indicated that site contaminants will not adversely affect the quality of the underlying **groundwater**, exposure of people to groundwater was eliminated from further consideration. The total potential effect of carcinogenic contaminants at the site was evaluated to determine if the total **incremental lifetime cancer risk (ILCR)** due to chemicals present at the site fell below or within the EPA's target risk range of 10^{-4}–10^{-6} (one in ten thousand to one in one million) risk of a carcinogenic effect. The potential effect of non-carcinogenic site contaminants was evaluated by determining the COPC-specific **hazard quotient (HQ)** (see text box) for each receptor. All HQs for each receptor were summed to determine if exposure to the chemicals at the site resulted in a total **hazard index (HI)** less than or equal to the target value of 1. The calculated ILCRs and HIs associated with each of the site receptors are shown in the table below.

Receptor	ILCR	Total HI
Current adolescent trespasser/visitor	6×10^{-7}	0.08
Future adolescent trespasser/visitor	9×10^{-7}	0.1
Current adult trespasser/visitor	7×10^{-7}	0.03
Future adult trespasser/visitor	1×10^{-6}	0.03
Current industrial worker	4×10^{-6}	0.2
Future industrial worker	6×10^{-6}	0.2
Future resident (adult and child)	2×10^{-5}	0.2 (adult)/2.0 (child)
Future construction worker	1×10^{-6}	1.0

All calculated ILCRs were either within the EPA's target range of 10^{-4}-10^{-6} or were below this range. All calculated total HIs were below the target value of 1, with the exception of the HI for a future child resident, which was calculated to be 2.0. Because the total HI was calculated to be above 1, the HHRA subsequently quantified the HI on a target organ basis. Because different chemicals affect different organs and have

What is Human Health Risk and How is it Calculated?

A baseline human health risk assessment estimates the potential for health problems to occur if no cleanup action were taken at a site. A four-step process is used to estimate baseline risk:

Step 1: Identify Chemicals of Potential Concern
Step 2: Estimate Exposure
Step 3: Assess Potential Health Dangers
Step 4: Characterize Site Risk

In Step 1, the concentrations of chemicals detected at the site are compared to values determined to be protective of human health. For Source Area 6, the basis of the health-protective values was the EPA Region III RBCs. Chemicals with concentrations that exceeded the health-protective values were identified as COPCs.

In Step 2, the risk assessor considers the different ways that people might be exposed to the COPCs identified in Step 1, the concentrations that people might be exposed to, and the potential frequency and duration of exposure. Using this information, the risk assessor estimates the amount of each COPC that a person may take into his/her body. Because it is difficult to determine with certainty how each person may contact the chemicals at the site, standard assumptions are used to ensure calculation of a reasonable yet conservative intake.

In Step 3, the information from Step 2 is combined with toxicity information obtained from the EPA to calculate the potential health risks under general assumptions. Two types of health effects are considered: cancer risk and non-cancer hazard. The cancer risk is expressed as a probability that cancer would result from the assumed exposure to the site chemicals. For example, a cancer risk of 2×10^{-6}, or 2 in a million, means that if a million people were exposed to the site chemicals in the same manner as assumed for the risk assessment, then two more people may get cancer than would normally be expected in the absence of the exposure.

For a non-cancer hazard, it is assumed that there is a threshold intake for each chemical above which people may experience an adverse effect. For each receptor, the estimated intake of each COPC is compared to this threshold value, resulting in a hazard quotient (HQ) for that COPC. All HQs for that receptor are added and the resulting sum is known as a hazard index (HI). If the HI for a receptor is 1 or less, non-cancer effects are not expected. If the HI for a receptor is greater than 1, then a target organ HI analysis is performed.

In Step 4, the results of the three previous steps are combined, evaluated, and summarized. The general assumptions used in Step 3 are evaluated against site-specific information. Whether any potential cancer risk or non-cancer hazard is due to background conditions is considered. Many metals, such as arsenic, occur naturally and may contribute substantially to the calculated ILCRs or HIs. In addition, a risk assessment is associated with uncertainty. The assumptions used to support the calculations are evaluated to qualitatively assess the conservatism of the assessment. Based on an evaluation of all relevant factors, the risk assessor determines whether the contaminants at the site pose a threat to human health.

different modes of action, a **target organ HI** analysis provides a more refined evaluation of whether a site poses a non-cancer hazard to a receptor. In a target organ HI analysis, the HQs for COPCs with the same target organ (such as the liver or central nervous system) are added; it is assumed that chemicals which have different target organs will not exert an additive effect. If the resulting target organ HI is less than or equal to 1, then non-cancer effects are not expected on that organ. All calculated target organ HIs for the future child resident were less than 1, indicating that exposure to the chemicals at the site will not result in a non-cancer effect. In summary, the conditions at the site are protective of people both under current conditions and under potential future uses.

4.2 SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT

Please see the text box on the next page for an explanation of the SLERA process.

The SLERA evaluated the potential for chemicals at the site to affect terrestrial receptors (plants, earthworms, insect-eating birds, carnivorous birds, omnivorous mammals, and carnivorous mammals) through direct contact with and ingestion of the surface soil. The scientific literature was searched and screening values were determined for contaminants detected at the site. The maximum concentration of each chemical was compared to the screening value for each receptor (where available) to determine the **ecological quotient (EQ)**. The screening value used for each receptor can be derived from the **no observed adverse effect level (NOAEL)** or the **lowest observed adverse effect level (LOAEL)**, as determined by laboratory studies available in the scientific literature. If the maximum concentration of a chemical resulted in an EQ greater than 1 for a receptor (using either the NOAEL or LOAEL), that chemical was considered a **chemical of potential ecological concern (COPEC)**. Dieldrin, vanadium, and zinc were identified in the initial screening process as COPECs based on ingestion by birds and mammals. No COPECs were identified based on effects on plant or earthworm populations. The initial screening process uses extremely conservative assumptions. Among these assumptions are: 1) the receptor is always exposed to the maximum concentration of each chemical at the site; 2) the receptor's foraging range does not include areas outside the site; and 3) all members of the receptor population are of the minimum body weight and forage at the maximum ingestion rate.

Following the initial screening, the three identified COPECs were subsequently evaluated in greater detail

What is Ecological Risk and How is it Calculated?

An ecological risk assessment evaluates the potential adverse effects that human activities have on the plants and animals that make up ecosystems. The ecological risk assessment process follows a phased approach similar to that of the human health risk assessment. The risk assessment results are used to help determine what measures, if any, are necessary to protect plants and animals.

Ecological risk assessment includes three steps:
Step 1: Problem Formulation
Step 2: Analysis
Step 3: Risk Characterization

The problem formulation includes:

- Compiling and reviewing existing information on the site habitat, plants, and animals that are present
- Evaluating how the plants and animals may be exposed
- Identifying and evaluating area(s) where site-related chemicals may be found
- Evaluating potential movement of chemicals in the environment
- Evaluating routes of exposure (for example, ingestion)
- Identifying receptors (plants and animals that could be exposed)
- Identifying exposure media (soil, air, water)
- Developing how the risk will be measured for all complete pathways (determining the risk where plants and/or animals can be exposed to chemicals)

The second step of the ecological risk assessment is risk analysis in which potential exposures to plants and animals are estimated and the concentrations of chemicals at which an effect may occur are evaluated.

The third step in the ecological risk assessment is risk characterization, in which all of the information identified in the first two steps are used to estimate the risk to plants and animals. Also included is an evaluation of the uncertainties (potential degree of error) that are associated with the predicted risk evaluation and their effects on the conclusions that have been made.

and using more realistic assumptions about actual exposure to receptors. Instead of the maximum concentration, the average site concentration is a better representation of the concentrations likely to be encountered by a receptor at any given point at the site. As there are uncertainties associated with any data set, the 95% **upper confidence level (UCL)** was determined for each of the three COPECs. The 95% UCL is the calculated concentration that will equal or exceed the true average concentration across the site 95% of the time. Comparing the 95% UCL concentration for a COPEC to the screening criteria instead of the maximum concentration provides a more accurate estimation of the level of an exposure for a receptor. The size of the site relative to the foraging areas of the affected receptors was considered, and the contaminant ingestion rate was adjusted in proportion to foraging area size for each considered receptor. Instead of considering the minimum size and maximum ingestion rate, the detailed evaluation of COPECs used estimates of body weight and ingestion rate for a more typical member of each receptor population.

It was determined that vanadium in the site surface soil has minimal potential to affect wildlife receptors adversely; the EQ calculated with the more realistic exposure assumptions was less than 1.

The zinc 95% UCL concentration resulted in an EQ of 1.7 for the insectivorous bird (American robin). However, the screening level established for zinc was based on the results from studies that evaluated the effects of zinc sulfate. Zinc in the form of zinc sulfate is readily **bioavailable**. It was determined through an examination of the soil data that the elevated zinc concentrations at the site were related to the tires. The form of zinc present in tires is zinc oxide, which is substantially less bioavailable than zinc in the form of zinc sulfate. Considering that the form of zinc at the site is substantially less likely to affect receptors than the form that was used to determine the EQ, and that the EQ was only marginally above the target of 1, it was determined that zinc at the site has a minimal potential to affect wildlife receptors adversely.

The NOAEL-based EQ for dieldrin was greater than 1 for the omnivorous mammal (white-footed mouse) and for the insectivorous bird (American robin). These EQs were 1.3 and 2.7, respectively. The LOAEL-based EQ for the white-footed mouse was less than 1. A spatial analysis of the dieldrin data indicated that the dieldrin concentrations leading to the elevated EQs are limited to a portion of the site and are not distributed site-wide. The dieldrin concentrations at the site that result in the NOAEL-based EQs greater than 1 for the American robin are limited to five sampled locations. Four of these five locations are adjacent to each other in the north-central portion of the site. Consequently, the concentrations that led to the NOAEL-based exceedences are limited to a portion of the site and do not cover the entire site. Based on the dieldrin distribution and the fact that the EQs were only slightly greater than 1, it was concluded that dieldrin is not present across the site at high enough concentrations to pose a risk of adverse effects to wildlife. The potential for dieldrin to impact site receptors is marginal. Various sources indicate that the half-life of dieldrin in the environment ranges from 7 to 11 years. Consequently, the dieldrin

contamination would be expected to fall below the calculated risk-based levels within a relatively short time.

4.3 RISK ASSESSMENT CONCLUSIONS

No unacceptable risks or hazards were calculated for any of the receptors evaluated in the baseline HHRA. The SLERA determined that chemicals present at the site had a minimal potential to cause adverse affects on ecological receptors. Based on the results of the baseline HHRA and the SLERA, it is recommended that Source Area 6 be considered for no further action.

5.0 NO FURTHER ACTION PROPOSAL

The proposed plan under CERCLA for Source Area 6 is no further action. Based upon the results of preliminary site characterization investigations, tire and debris removal actions, and confirmation sampling efforts conducted at the site, Source Area 6 does not pose an unacceptable risk to human health or the environment. The proposal to perform no further action is expected to fulfill all statutory and regulatory requirements. Under this alternative, no further remedial action will be performed at the site. However, this proposal may be changed if public comments or additional data indicate that a revised proposal is necessary to protect human health and the environment. Acceptance and regulatory approval of no further action would mean that the land is free of known environmental concerns related to toxicity and is allowed for unlimited exposure. The site would be appropriate for unrestricted residential or commercial use unless otherwise limited by area zoning or other local laws.

6.0 COMMUNITY PARTICIPATION

The public is strongly encouraged to review and comment on this Proposed Plan. If any significant new information or public comments are received during the public comment period, the Proposed Plan for no further action may be modified to acknowledge new information.

The minimum 30-day public comment period will begin on February 2, 2006 and extend to March 3, 2006. Notice of the public comment period will be printed in the local newspapers. In addition, the public comment period will include a **public meeting** during which the USACE, EPA, and VDEQ will provide an overview of the site and investigation findings, answer questions, and accept public comments on the Proposed Plan.

The public meeting will be held at the time and location shown below:

February 2, 2006 from 6 to 8 p.m.
Bon Secours Health Center at Harbour View
5818 Harbour View Boulevard
Suffolk, Virginia 23435
(757) 673-5800

Comments on the Proposed Plan will be summarized and responses provided in the Responsiveness Summary Section of the **Record of Decision (ROD)**. To submit written comments or obtain further information, please contact one of the following representatives:

Mr. George H. Mears, ME, MBA
Project Manager
U.S. Army Corps of Engineers, Norfolk District
803 Front Street
Norfolk, Virginia 23510-1096
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Written comments must be postmarked no later than the last day of the public comment period, which is March 3, 2006.

The Administrative Record contains all of the information that was used to develop this proposed final action for Source Area 6. The Administrative Record also provides important background and site investigation information in more detail than is presented in this Proposed Plan. The Administrative Record is available for public viewing at the following locations:

Tidewater Community College Library
7000 College Drive
Portsmouth, Virginia 23703
(757) 822-2124

U.S. Army Corps of Engineers, Norfolk District
803 Front Street
Norfolk, Virginia 23510-1096
(757) 201-7606

7.0 REFERENCES

HydroGeoLogic, Inc., 2001, *Summary of Tire Pile Removal Field Activities at the Former Nansemond Ordnance Depot, Suffolk, Virginia.*

HydroGeoLogic, Inc., 2005, *Final Remedial Investigation Report for Source Area 6 – Track K Dump (Tire Pile/Pant Can Area) at the Former Nansemond Ordnance Depot, Suffolk, Virginia.*

MicroPact Engineering, Inc., 2002. *Sampling Trip Report, FNOD.*

U.S. Army Corps of Engineers, Norfolk District, 2001a. *Draft Site Management Plan, Former Nansemond Ordnance Depot, Fiscal Year 2002.*

U.S. Army Corps of Engineers, Norfolk District, 2001b. *Work Plan for Removal Action at the Tire Pile/Paint Can Site, Former Nansemond Ordnance Depot, Suffolk, Virginia.*

U.S. Army Corps of Engineers, Norfolk District, 2002. *Draft Site Management Plan, Former Nansemond Ordnance Depot, Fiscal Year 2003.*

U.S. Environmental Protection Agency, January 1999, *Hazardous Ranking System Documentation Record from the Former Nansemond Ordnance Depot – HRS Scoring Package.*

8.0 GLOSSARY OF TERMS AND ACRONYM LIST

This glossary defines in non-technical language the environmental terms appearing in this Proposed Plan. The definitions do not constitute the EPA's official use of terms and phrases for regulatory purposes, and nothing in this glossary should be construed to alter or supplant any other federal document. Official terminology may be found in the laws and related regulations as published in such sources as the Congressional Record, Federal Register, and elsewhere.

Administrative Record — Required by CERCLA Section 113(k), an administrative record is a combination of documents and other materials that provide the basis for the selection of a response action. The administrative record is required for every response action and may be used for judicial review.

Background — Many chemicals that could be considered to be contamination at a site can also occur naturally or be present due to human activities that are unrelated to the site. Many metals occur naturally as constituents of soil and are present in soil and water samples at concentrations that are measurable by the investigation analytical methods. Background studies collect samples from areas that are not considered to have been contaminated, and the results of these studies are evaluated statistically to provide benchmarks for comparison to site results. Some classes of organic compounds, such as polynuclear aromatic hydrocarbons (a class of compounds present in oils, tars, and burned plant materials) and PCDDs/PCDFs, are widely distributed in the environment due to human activities as well as natural events, such as fires. The background distribution of these organic chemicals can be very uneven, however, and the results of background sampling often results in data sets with skewed distributions that do not allow for a useful statistical evaluation.

bgs — Below ground surface

Bioavailable — The chemical is in a form that is readily absorbed by the body of the exposed receptor, either human, plant, or animal.

CERCLA — Comprehensive Environmental Response, Compensation, and Liability Act — CERCLA, also known as the Superfund Law, was enacted in 1980 and was later amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986. CERCLA provides the authority and procedures for responding to releases of hazardous substances, pollutants, and contaminants from inactive hazardous waste disposal sites.

COPCs — Chemicals of Potential Concern — Many chemicals detected at a site are present at concentrations that pose no risk to humans. In order to reduce the number of calculations necessary for the human health risk assessment, the maximum concentration of each detected chemical is compared to a screening value determined to be protective of human health (such as the RBC). Those chemicals with a maximum concentration that exceeds the screening value are identified as chemicals of potential concern, and are evaluated in detail in the quantitative risk assessment.

COPECs — Chemicals of Potential Ecological Concern — Chemicals of potential ecological concern are the ecological equivalent of COPCs. Chemicals of potential ecological concern are initially identified by comparing the maximum detected concentration to a soil screening level and the maximum chemical intake to a no observed adverse effect level.

DERP — Defense Environmental Restoration Program — A DoD program, mandated by SARA Section 120. DERP addresses the removal and remedial clean-up activities at active military sites under the Installation Restoration Program (IRP) and at Formerly Used Defense Sites (FUDS).

DoD — U.S. Department of Defense

Environmental Restoration Defense Account — The Environmental Restoration Defense Account (ERDA) was established by Public Law 98-212 in 1983. This Congressionally-directed fund was to be used for environmental restoration at DoD active installations and formerly used properties. The DoD designated the Army as the sole manager for environmental restoration at closed installations and formerly used properties. The Secretary of the Army assigned this mission to USACE in 1984.

EPA — U.S. Environmental Protection Agency

EQ — Ecological Quotient — A measure of whether exposure to a chemical has the potential to cause an adverse health effect on an specific ecological receptor. The acceptable EQ is less than one; if it exceeds one, the chemical has the potential to pose an adverse effect on that receptor.

Explosives — In analytical chemistry, this is a class of organic compounds that is generally categorized as nitramines and nitroaromatics. The compounds analyzed on the 'standard' explosives lists include compounds that are explosives in themselves (e.g., RDX, TNT) and compounds that are breakdown products or manufacturing impurities of explosives.

Federal Register — The Federal Register is the official daily publication for Rules, Proposed Rules, and Notices of Federal agencies and organizations, as well as Executive Orders and other Presidential Documents. The Code of Federal Regulations (CFR) is a codification of the general and permanent rules published in the Federal Register by the Executive departments and agencies of the Federal Government.

FNOD — Former Nansemond Ordnance Depot

FUDS — Formerly Used Defense Sites — The Department of Defense (DoD) is responsible for cleaning up properties that were formerly owned, leased, possessed, or operated by DoD. Such properties are known as Formerly Used Defense Sites.

GE — General Electric Corporation

GPS — Global Positioning System

Groundwater — Water beneath the ground surface that fills spaces between materials such as sand, soil, or gravel to the point of saturation. Groundwater may transport substances that have percolated downward from the ground surface as it flows towards its point of discharge.

Half-life — The amount of time that it takes for the concentration of a chemical in the environment to be reduced by one-half by physical processes (such as evaporation), chemical processes (like oxidation), or biological processes (like microbial degradation).

Hazard Ranking System — The principal screening tool used by EPA to evaluate risks to public health and the environment associated with abandoned or uncontrolled hazardous waste sites. The Hazard Ranking System calculates a score based on the potential for hazardous substances spreading from the site through the air, surface water, or ground water, and on other factors such as nearby population. This score is the primary factor in deciding if the site should be on the National Priorities List (NPL) and, if so, what ranking it should have compared to other sites on the list. A site must score 28.5 or higher to be placed on the NPL.

HHRA — Human Health Risk Assessment — An HHRA estimates the potential cancer risks and non-cancer hazards associated with the exposure of individuals to chemicals at a site under current site conditions and potential future site conditions.

HI — Hazard Index — A measure of whether exposure to a chemical has the potential to cause a non-cancer, adverse health effect in a human. It is the sum of all hazard quotients calculated for each contaminant of potential concern at the site for each receptor. The acceptable HI is less than or equal to 1; if it exceeds 1, target organ HIs (see below) are calculated to evaluate the possibility for systemic toxic effects.

HQ — Hazard Quotient — The estimated site-specific exposure to a contaminant over a specified period divided by the estimated exposure level at which no adverse health effects are likely to occur.

HRSD — Hampton Roads Sanitation District

HGL — HydroGeoLogic, Inc.

ILCR — Incremental Lifetime Cancer Risk — The ILCR is formulated and interpreted as a probability of developing cancer sometime during a lifetime, the value ranges from zero to one. The background ILCR is approximately 0.33 (one in three). The USEPA's acceptable range for a site contribution to the ILCR is 10^{-4} to 10^{-6} (one in ten thousand to one in one million); a site contribution of 10^{-6} or less is considered minimal.

LOAEL — Lowest Observed Adverse Effect Level — The lowest daily intake of a chemical that has been determined by a toxicity study to have an observed adverse effect on a receptor organism.

mg/kg — milligrams per kilogram

MicroPact — MicroPact Engineering, Inc.

NCP — National Oil and Hazardous Substances Pollution Contingency Plan — The purpose of the NCP is to provide the organizational structure and procedures for preparing for and responding to discharges of oil and releases of hazardous substances, pollutants, and contaminants.

No Further Action — One of the remediation alternatives available after site investigation activities are completed. For the No Further Action alternative to be selected, it must be satisfactorily demonstrated that any material remaining at the site is not at a concentration that will have an adverse effect on human health or the environment, nor is it likely to under future site uses.

NOAEL — No Observed Adverse Effect Level — The highest daily intake of a chemical that has been determined by a toxicity study to have no observed adverse effect on a receptor organism.

NPL — National Priorities List — EPA's list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial action under Superfund. The list is based primarily on the score a site receives from the Hazard Ranking System. EPA is required to update the NPL at least once a year.

PCB — Polychlorinated Biphenyl — A group of toxic, environmentally persistent, chlorinated chemicals used in electrical transformers and capacitors for insulating purposes and in gas pipeline systems as lubricant. The sale and new use of PCBs were banned by law in 1979.

PCDDs/PCDFs — Polychlorinated Dibenzo-*p*-dioxins/Polychlorinated Dibenzofurans — A class of compounds that are a byproduct of the industrial processes used to create PCBs, pesticides, herbicides, and bleached paper; they can also be created by incomplete combustion of chlorinated organic compounds. PCDDs/PCDFs persist in the environment and are considered to be toxic, especially those that show a 2,3,7,8- substitution pattern.

Pesticides — Any of a class of compounds used to kill insects and other invertebrates. This class of compounds is broad and encompasses many different chemical types; however, the pesticide compounds that were analyzed for in Source Area 6 samples were organochlorine pesticides. The standard compound list for organochlorine pesticide analysis includes both pesticides themselves (such as DDT) as well as related compounds that are breakdown products or manufacturing impurities (such as DDD and DDE).

Proposed Plan — A public participation requirement of CERCLA in which a proposed action or preferred cleanup strategy, rationale for the preference, and other alternatives are summarized for the public to solicit community participation in the decision making process.

PRP — Potentially Responsible Party — An individual or company (such as owners, operators, transporters, or generators of hazardous waste) potentially responsible for, or contributing to, the contamination problems at a Superfund site. Whenever possible EPA requires PRPs, through administrative and legal actions, to clean up hazardous waste sites they have contaminated.

Public Comment Period — The time allowed for the members of a community to express views and concerns regarding an action proposed to be taken by EPA, such as a rule, permit, or Superfund remedy selection.

Public Meeting — A meeting that is open to the public where experts are available to present information and answer questions. Citizens are encouraged to ask questions and to offer comments.

RBC — Risk-Based Concentration — Concentration levels for individual chemicals that correspond to a target risk level, usually a cancer risk level of 10^{-6} (one in one million) for carcinogens, and a hazard index of 1 for non-carcinogenic effects.

Receptor — An individual, either a human, plant or animal, which may be exposed to a chemical present at the site.

ROD — Record of Decision — A public decision document that explains which cleanup alternative(s) will be used at a NPL site. A Record of Decision is based on

information and technical analysis generated during various site investigations and consideration of public comments and community concerns. A Record of Decision may also establish a finding of no further action.

SARA — Superfund Amendments and Reauthorization Act — SARA amended CERCLA on October 17, 1986. SARA reflected EPA's experience in administering the complex Superfund program during its first six years and made several important changes and additions to the program. SARA created a special tax from which the proceeds go into a Trust Fund, commonly known as Superfund, to pay for investigation and clean up of abandoned or uncontrolled hazardous waste sites. Under the program, EPA can either pay for site cleanup when parties responsible for the contamination cannot be located or are unwilling or unable to perform the work; or take legal action to force parties responsible for site contamination to clean up the site or pay back the Federal government for the cost of cleanup.

SLERA — Screening Level Ecological Risk Assessment — A SLERA is a conservative evaluation of the potential for chemicals at a site to pose a risk of adverse effects to ecological receptors (plants, invertebrates, wildlife).

SSL — Soil Screening Level — The maximum concentration of a chemical in soil that is conservatively considered to be protective of the quality of the underlying groundwater.

Superfund — The program operated under the legislative authority of CERCLA and SARA that funds and carries out EPA solid waste emergency and long-term removal and remedial activities. These activities include establishing the National Priorities List, investigating sites for inclusion on the list, determining their priority, and conducting and/or supervising cleanup and other remedial actions.

SVOC — Semivolatile Organic Compound — A class of organic compounds that consist primarily of industrial chemicals, plastic additives, and compounds found in petroleum oils, coal, and tar. Most of these compounds are oily liquids or solids. These compounds are not as volatile as VOCs and have a tendency to remain in place rather than move once released into the environment.

Target Organ Hazard Index (Target Organ HI) — A measure of the potential for the chemicals present at the site to cumulatively cause an adverse effect to a specific organ, such as the liver or the kidneys.

TCC — Tidewater Community College

UCL — Upper Confidence Level — A confidence level is a tool for acknowledging uncertainties and variability within an environmental data set without presenting an unacceptable risk to human health or the environment. In environmental studies, the uncertainties are commonly due to limited sampling data; we can only estimate the true mean of the concentrations sampled in the environment. The 95% UCL defines a value that equals or exceeds the true mean 95% of the time.

USACE — U.S. Army Corps of Engineers

UXO — Unexploded Ordnance

VDEQ — Virginia Department of Environmental Quality — The Commonwealth of Virginia's state environmental agency, responsible for oversight of Commonwealth environmental matters and the implementation of environmental laws and programs.

VOC — Volatile Organic Compound — A class of organic compounds that includes a wide range of industrial and commercial solvents and compounds found in gasoline and other petroleum fuels. These compounds share the physical property of volatility, which means they are very likely to vaporize at everyday temperatures.

Weston — Weston Solutions, Inc. (formerly known as Roy F. Weston, Inc.)